# PATENT COOPERATION TREATY



# PCT

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference FP-09-0918 | **FOR FURTHER ACTION** | See Form PCT/IPEA/416 |
|---|---|---|
| International application No. PCT/GB2004/004737 | International filing date *(day/month/year)* 10.11.2004 | Priority date *(day/month/year)* 11.11.2003 |
| International Patent Classification (IPC) or national classification and IPC B60L5/20 | | |
| Applicant MORGANITE ELECTRICAL CARBON LIMITED ET AL. | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 2 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

| | | |
|---|---|---|
| ☒ | Box No. I | Basis of the opinion |
| ☐ | Box No. II | Priority |
| ☐ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☐ | Box No. VII | Certain defects in the international application |
| ☐ | Box No. VIII | Certain observations on the international application |

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 24.05.2005 | 20.10.2005 |
| Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 | Authorized Officer Bolder, G Telephone No. +31 70 340-3636 |

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/004737

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

| | |
|---|---|
| **Description, Pages** | |
| 1-7 | as originally filed |
| **Claims, Numbers** | |
| 1-15 | received on 24.05.2005 with letter of 20.05.2005 |
| **Drawings, Sheets** | |
| 1/2, 2/2 | as originally filed |

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/004737

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-15 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | 1-15 |
| | No: | Claims | |
| Industrial applicability (IA) | Yes: | Claims | 1-15 |
| | No: | Claims | |

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document:

D1: JP 01 270571 A (NIPPON STEEL CHEM CO LTD) 27 October 1989 (1989-10-27)

1. INDEPENDENT CLAIM 1

1.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A composite electrical collector, for use in transferring electricity to or from a conductor and to make sliding contact with the conductor, the collector comprising a metal mesh embedded in a matrix of metal-impregnated carbon materials.

The subject-matter of claim 1 differs from this known collector in that the matrix consists of non-metal-impregnated carbon materials.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

1.2 The problem to be solved by the present invention may be regarded as how to minimize density of the current collector material.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

D1 and all other prior art indicate to make current collector matrices using metal-impregnated carbon materials. There is nothing in the prior art that would indicate that by omission of the metal impregnation a material with comparable electrical resistivity and lower density could be obtained.

2. INDEPENDENT CLAIM 11

Claim 11 describes the method of making the current collector of claim 1 and following the same reasoning as above is therefore also new and inventive.

3. DEPENDENT CLAIMS 2-10, 12-15

Claims 1-10, 15 are dependent on claim 1, while claims 12-14 are dependent on claim 11. As such they also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A composite electrical collector, for use in transferring electricity to or from a conductor and to make sliding contact with the conductor, the collector comprising a metal mesh embedded in a tribologically acceptable matrix selected from the group:-

   non metal-impregnated carbon materials

   coke/graphite/resin composites

   ceramic materials

   carbon/ceramic mixes

   high temperature thermoplastics loaded with appropriate fillers.

2. A composite electrical collector as claimed in Claim 1, in which the tribologically acceptable matrix additionally comprises one or more additives selected from the group:-

   strengthening and/or electrically conductivity improving fibres;

   thermally conductive materials;

   electrically conductive fillers;

   abrasive materials;

   lubricants

   antioxidants

3. A composite electrical collector as claimed in Claim 1 or Claim 2, in which the carbon based material is a coke/graphite/resin mix.

4. A composite electrical collector as claimed in any one of Claims 1 to 3 , in which the metal mesh is a copper mesh.

5. A composite electrical collector as claimed in any one of Claims 1 to 4, in which the metal mesh embedded in a tribologically acceptable matrix consists of a pressed laminated body of coke/graphite/resin matrix material and metal mesh.

Agent's ref: FP-09-0918

6. A composite electrical collector as claimed in any one of Claims 1 to 5, in which one or more non-metallic strengthening web layers are provided in addition to the metal mesh.

7. A composite electrical collector as claimed in Claim 6, in which the non-metallic strengthening web layers are distributed non-uniformly within the body of the collector.

8. A composite electrical collector as claimed in any one of Claims 1 to 7, in which the metal mesh comprises a plurality of metal meshes embedded in the tribologically acceptable matrix.

9. A composite electrical collector as claimed in Claim 8, in which the plurality of metal meshes are distributed non-uniformly within the body of the collector.

10. A composite electrical collector as claimed in any one of Claims 1 to 9, in which the metal mesh is disposed non-perpendicular to a conductor contacting face of the collector.

11. A method of making a composite electrical collector as claimed in any preceding claim in which layers of matrix material and metal mesh are pressed together to form a laminated structure without a metal impregnation step.

12. A method, as claimed in Claim 11, in which the laminated structure is raised to an elevated temperature after or during pressing.

13. A method, as claimed in Claim 12, in which the laminated structure is kilned under an inert atmosphere.

14. A method, as claimed in any one of Claims 11 to 13, in which the laminated structure is resin impregnated after forming.

15. An electrically powered vehicle drawing current from a conductor by a collector as claimed in any one of Claims 1 to 10.